

WHAT IS CLAIMED IS:

1. A method for generating backup files in a computer system, comprising:

generating a full backup file corresponding to a first time for a set of objects in the computer system;

5 generating at least one incremental file for said set of objects after said first time;

identifying a target object within said set of objects for the generation of cumulative backup files; and

generating at least one cumulative backup file corresponding to a second time, after said first time, for said target object, wherein said generating of said at least one cumulative backup file is performed off-line.

2. A method for generating backup files according to claim 1, wherein said generating of said at least one cumulative backup file includes analyzing at least one incremental file generated between said first and second time.

3. A method for generating backup files according to claim 2, wherein said analyzing of said at least one incremental file is performed in reverse chronological order, starting from said second time.

4. A method for generating backup files according to claim 1, further comprising restoring said target object to said second time by processing said full backup file and said at least one cumulative backup file.

5. A method for generating backup files according to claim 1, further comprising restoring said target object to a third time later than said second time by processing a full backup file, said at least one cumulative backup file and any incremental backup files generated between said second time and said third time.

6. A method for generating backup files according to claim 1, wherein said identifying includes identifying a related subset of files as said target object for a cumulative backup file.

7. A method for generating backup files according to claim 1, wherein said identifying includes identifying a volume as said target object for a cumulative backup file.

5 8. A method for generating backup files according to claim 1, wherein said identifying includes identifying a directory as said target object for a cumulative backup file.

9. A method for generating backup files according to claim 1, wherein a user identifies the target object.

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10. A method for generating backup files according to claim 1, further comprising monitoring and analyzing restore operations in said computer system, wherein said target object is identified in response to said monitoring and analyzing.

15 11. A method for generating backup files according to claim 1, wherein said identifying of said target object is designed to meet a condition of bounded restore time for said target object.

12. A method for generating backup files according to claim 1, further comprising
20 controlling the frequency of generating at least one of a full, incremental and cumulative backup.

13. A computer-readable medium having computer-executable instructions for instructing a client computer to perform the method of claim 1.

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14. A data structure stored in a computer readable medium for representing cumulative backup information for a target object generated according to the method of claim 1, comprising:

30 storage block mappings for said target object; and
cumulative backup data representative of change of the target object relative to a full

backup wherein said data representative of said change is stored in the format of MTF.

15. A method for generating backup files in a computer system, comprising:

- 5 generating a full backup file corresponding to a first time for a set of objects in the
computer system;
 generating at least one incremental file for said set of objects after said first time;
 identifying a target object within said set of objects for the generation of cumulative
backup files; and
 generating at least one cumulative backup file corresponding to a second time, after
10 said first time, for said target object, wherein said generating of said at least one cumulative
backup file includes analyzing at least one incremental file generated between said first and
second time.

15 16. A method for generating backup files according to claim 15, wherein said analyzing of
said at least one incremental file is performed in reverse chronological order, starting from
said second time.

20 17. A method for generating backup files according to claim 15, wherein said generating
of said at least one cumulative backup file is performed off-line.

18. A method for generating backup files according to claim 15, further comprising
monitoring and analyzing restore operations in said computer system, wherein said target
object is identified in response to said monitoring and analyzing.

25 19. A method for generating backup files according to claim 15, wherein said identifying
of said target object is designed to meet a condition of bounded restore time for said target
object.

30 20. A method for generating backup files according to claim 15, further comprising
controlling the frequency of generating at least one of a full, incremental and cumulative

backup.

21. A computer-readable medium having computer-executable instructions for instructing a client computer to perform the method of claim 15.

22. A computer system, comprising:

a plurality of servers having at least one connection to a communications network; and

a plurality of storage components for the storage of backup information for a target object in the form of full, incremental and cumulative backup information;

wherein said full backup information is generated at a first time and said cumulative backup information is generated at a second time, wherein said storage components are accessible over said at least one connection via said plurality of servers, wherein said cumulative backup information is generated off-line and wherein said target object may be efficiently reconstructed to said second time associated with said cumulative backup information.

23. A computer system according to claim 22, wherein the reconstructing of said target object to said second time includes processing at least one cumulative backup file associated with said second time and a full backup file associated with said first time.

24. A computer system according to claim 22, wherein the reconstructing of said target object to a third time later than said second time is performed by processing at least one cumulative backup file associated with said second time, a full backup file associated with said first time, and any incremental backup files generated between said third time and said second time.

25. A computer system according to claim 22, wherein said plurality of storage components store backup information for said target object according to a user specification as to which subset of files is said target object.

26. A computer system according to claim 22, wherein said plurality of storage components store backup information for a volume as said target object.

27. A computer system according to claim 22, wherein said plurality of storage components store backup information for a directory as said target object.

28. A computer system according to claim 22, wherein at least one of said plurality of servers generates said backup information in response to monitoring and analyzing an inefficiency of a system restore operation.

29. A computer system according to claim 22, wherein the generation of backup information is designed to meet a condition of bounded restore time for the target object.

30. A computer system according to claim 22, wherein the generation of a cumulative backup file includes the analysis of at least one incremental file generated after said first time associated with the full backup information.

31. A computer system according to claim 30, wherein said analysis of said at least one incremental file is performed in reverse chronological order, from said second time to said first time.

32. A computer system, comprising:

a plurality of servers having at least one connection to a communications network; and
a plurality of storage components for the storage of backup information for a target

object in the form of full, incremental and cumulative backup information;

wherein said full backup information is generated at a first time and said cumulative backup information is generated at a second time, wherein said storage components are accessible over said at least one connection via said plurality of servers, wherein said target object may be efficiently reconstructed to said second time associated with said cumulative backup information and wherein the generation of a cumulative backup file includes the

analysis of at least one incremental file generated after said first time associated with the full backup information.

33. A computer system according to claim 32, wherein said analysis of said at least one
5 incremental file is performed in reverse chronological order, from said second time to said
first time.

34. A computer system according to claim 32, wherein said analysis of said at least one incremental file is performed off-line.

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